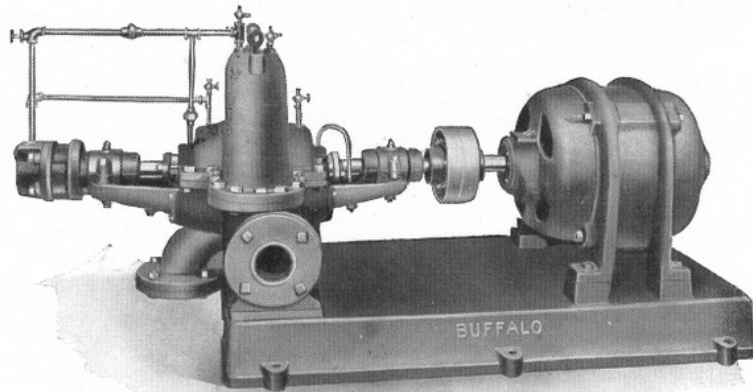


# BUFFALO

**Single Suction Two Stage Class "R"  
Centrifugal Pumps and Centrifugal  
Underwriter Fire Pumps**



**Bulletin No. 961**

**Buffalo Steam Pump Co.  
Buffalo, N. Y.**

New York  
Boston  
Philadelphia  
Pittsburgh  
Charlotte, N. C.

Cleveland  
Detroit  
Chicago  
St. Louis  
Los Angeles  
Kansas City, Mo.

New Orleans  
Atlanta  
Minneapolis  
Denver  
Cincinnati

**Canadian Blower & Forge Co., Ltd.  
Kitchener, Ont., Canada**

Toronto

Montreal

Calgary

Vancouver

St. John.

## Buffalo Two Stage Class "R" Centrifugal Pumps

Buffalo Class "R" single suction impeller multi-stage centrifugal pumps meet with high favor wherever used. This type of pump is built in two stages only with horizontally divided casing and single suction impellers placed back to back.

These pumps are offered for capacities up to 2000 U. S. Gallons per minute, and for heads as high as 350 ft. They are especially designed for direct connection to motors, and can also be furnished for pulley drive. Built only for left hand rotation and with outboard suction opening as shown in illustrations.

Class "R" pumps are recommended for almost any service where clear cold water is being handled. High efficiency and absolute reliability are assured when you install one of these units.

Each pump is tested for actual operating conditions before leaving factory.

### CASING:

The casing is the horizontally divided type, the suction and discharge nozzles being cast in the lower half, permitting the removal of the upper half so the interior parts can be inspected or removed without disturbing the pipe connections. The casing has machined joints, and flanges are secured together with heavy bolts.

Water passages are simply formed and of ample areas to avoid friction losses and sudden changes of velocity. Due to the opposed impeller feature, the pump is in perfect hydraulic balance under all conditions of head and pressure.

Diffusion vanes are not required.

### IMPELLERS:

The impellers are the single suction type, placed back to back as shown in Fig. 1094. With suction inlets opposed, it can readily be seen that all thrust tendency is overcome and a balanced pump produced. No balancing chambers, with corresponding leakage and loss of pressure and efficiency, are required. In addition all pumps are equipped with a marine type thrust bearing. This keeps the impellers in a central position when starting up, and takes up thrust if one impeller becomes partly clogged with foreign material.

Standard impellers are brass on 2" and 2½" sizes, and cast iron on all other sizes.

Every impeller is carefully machined and finished and then accurately tested to see that it is in perfect balance.

### CLEARANCE RINGS:

The clearance rings are the flat surface floating type, made of bronze and carefully machined all over. These rings are located around the suction opening of each impeller and surrounding the shaft between stages. They are the "L" section type ensuring strength without undue weight, and are arranged so that they are held in

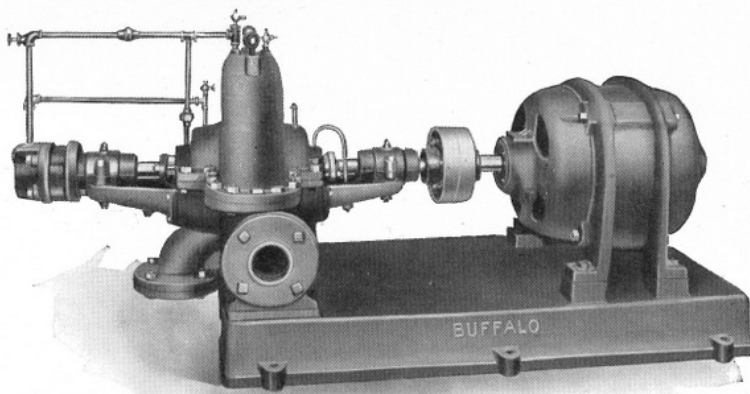


Fig. 1224

4" and Smaller Two Stage Class "R" Pumps

position by the difference in pressure between stages, thus ensuring a tight joint between stages, and this also prevents them from turning with the impellers. This arrangement eliminates friction and leakage.

#### **SHAFT BEARINGS:**

Pump bearings are located at each end of the casing and consist of heavy cast iron bracket housings with flanges bolted to the pump casing and centered in turned and bored fittings.

The bracket is provided with an ample oil reservoir and the bearing itself is lubricated by means of a brass oil ring, suitable provision being made for returning oil to the reservoir after passing through the bearing, also for filling and draining. Bearings are provided with a brass cased sight oil gauge.

On 2" and 2½" pumps the bearings have split bronze bushings. On 3" and larger pumps the bearing bushings are split and lined with high grade babbitt, peined, bored and scraped. Housings are split horizontally.

#### **THRUST BEARING:**

Thrust bearing is the multiple collar marine type, and consists of a horizontally split and babbitted housing with flange, bolted to the outer end of outer pump bearing. The thrust collars are machine steel turned from a solid forging, bored to fit over the outer end of pump shaft, and secured by feather key and nut. The thrust bearing is provided with an oil chamber connected by a channel with the outer pump bearing, and a copious supply of oil is circulated over the thrust collars at all times by means of a small brass oil wheel revolving in the oil chamber and feeding the oil through suitable circulating passages.

The housing and end thrust cover are provided with water jacket arranged to permit a proper circulation of cooling water to maintain the oil at a proper temperature for lubrication.

#### **STUFFING BOXES:**

Stuffing boxes are cast in each end of the pump casing. They are deep and provide for an ample amount of packing, which is furnished with pump.

#### **GLANDS:**

Packing glands are the bolted type and have flange which is secured to the stuffing box flange by studs and adjusting nuts. Regularly made in cast iron with brass bushings.

#### **WATER SEAL:**

Water seal consisting of brass cage rings with suitable circulating holes is provided on suction gland. This prevents air entering pump, which would cause it to lose its prime or get air bound.

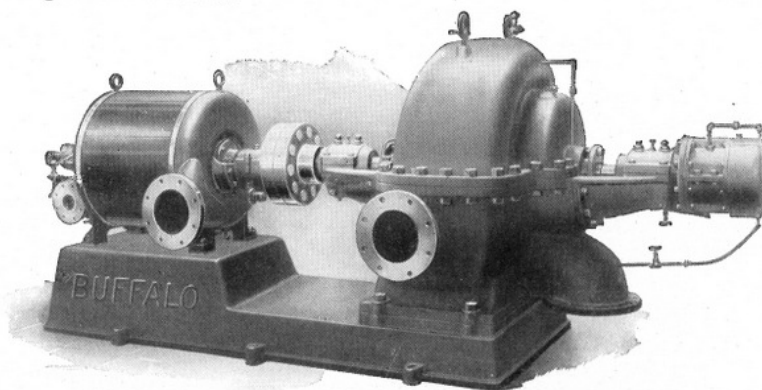


Fig. 1211  
5" to 8" Two Stage Class "R" Pumps

### SHAFT:

The shaft is made of high grade steel, machined all over. Impellers are mounted on an enlargement of diameter at about the center of the shaft and each impeller is secured by its individual key. Keyways are spaced radially around shaft so as to maintain its strength to the fullest extent. The shaft has a shoulder turned in place which locates the first impeller. Shaft is brass covered where in contact with liquid, brass tubing being forced on under hydraulic pressure.

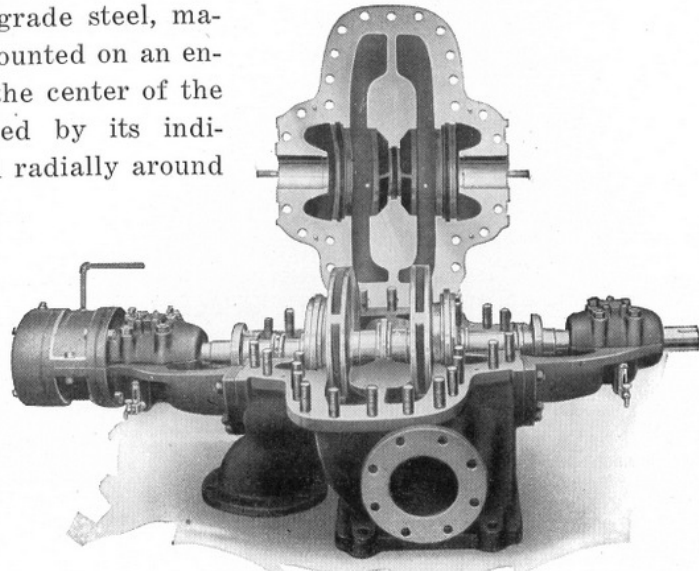


Fig. 1210

Class "R" Two Stage Pump With Upper Half of Casing Raised

### OPENINGS:

Suction and discharge openings are flanged. Companion flanges are furnished only on 6" and smaller pumps.

### SUBBASE:

Subbase is cast iron of very substantial construction, suitably ribbed, and provided with heavy lugs cast on the outside for foundation bolts.

Ample machine finished pads are provided on the top of subbase for mounting and bolting the pump and motor. In case of pulley driven pumps, the subbase is as just described, except it is made with machined pads for mounting pedestal bearing. The pedestal bearing is of heavy cast iron construction, the bearing lubricating arrangement being similar to that used in the main pump bearings.

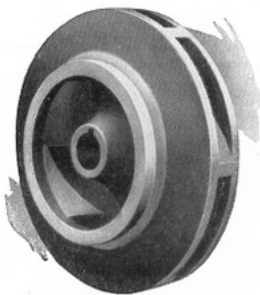


Fig. 1070

Class "R" Single Suction Impeller

### COUPLING:

Flanged or flexible type. All couplings are of ample strength to carry maximum loads required and are carefully machined, and in rotary balance.

### PULLEY:

Pulley is heavy cast iron in one piece, carefully machined and balanced and mounted on shaft with feather key.

# Buffalo Two Stage Class "R" Centrifugal Pumps

## Sectional Views

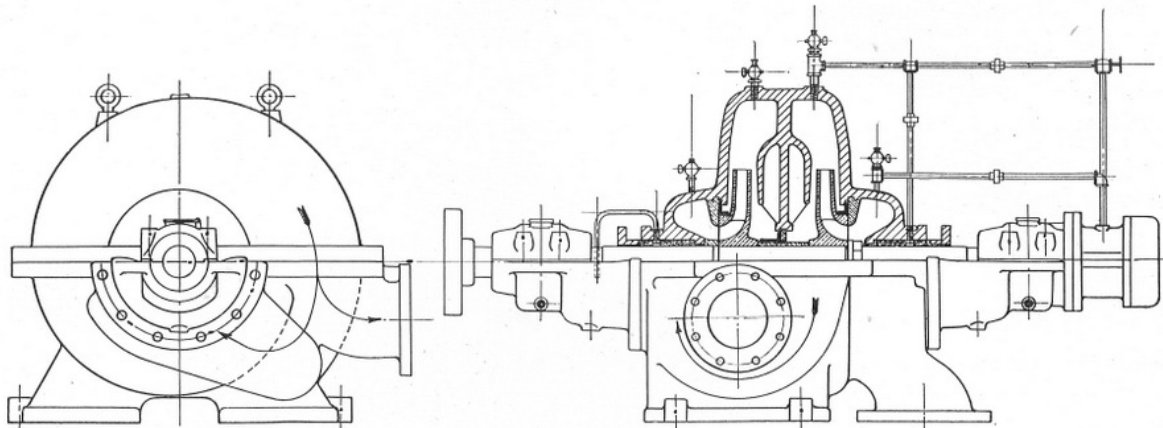


Fig. 1094  
Sectional View of 2 Stage Class "R" Pump

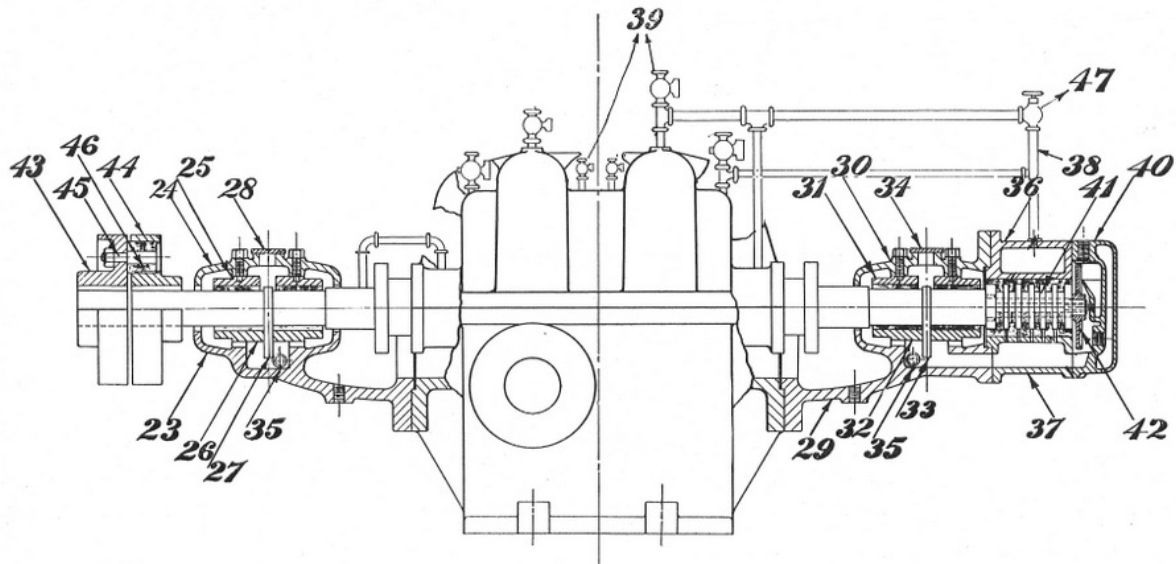


Fig. 1095  
Sectional View of 2 Stage Class "R" Bearings and Coupling

No.	Name of Part	Remarks	No.	Name of Part	Remarks
23	Bearing Bracket	Inner	36	Thrust Housing	Lower
24	" Cap	"	37	" "	Upper
25	" Bushing	Upper	38	Water Seal & Thrust	Cooling Piping
26	" "	Lower	39	Air Cocks	
27	Oil Ring	For Inner Bearing	40	" Cover	
28	" Cover	" " "	41	" Collar	
29	Bearing Bracket	Outer	42	Oil Runner	
30	" Cap	"	43	Flexible Coupling	Driving Half
31	" Bushing	Upper	44	" "	Driven "
32	" "	Lower	45	Coupling Pins	
33	Oil Ring	For Outer Bearing	46	" Bushings	
34	" Cover	" " "	47	Angle Valve	
35	Sight Oil Gauge	Not Shown			

# Buffalo Two Stage Class "R" Centrifugal Pumps

## Specifications

### CASING:

Cast iron, divided on horizontal center line. Suction and discharge openings cast in lower half, allowing interior parts to be inspected or removed without breaking pipe connections.

### IMPELLERS:

Single suction enclosed type. Brass on 2" and 2½" pumps. Cast iron on larger sizes. Mounted on shaft with feather keys.

### CLEARANCE RINGS:

Bronze, "L" section, floating type. Located around suction opening of each impeller and surrounding the shaft between stages. Will not turn with impellers. Prevent leakage and eliminate friction.

### SHAFT BEARINGS:

Ring oiling. One bearing mounted on bracket at each side of pump casing. 2" and 2½" pump bearings have split bronze bushings. Other sizes have split bushings, lined with high grade babbitt, peined, bored and scraped.

Horizontally split housings.

### THRUST BEARING:

Multiple collar marine type. Horizontally split housing, babbitted. Thrust collars machine steel turned from a solid forging. Housing water jacketed. Oil circulated continuously over thrust collars.

### STUFFING BOXES:

Extra deep. Furnished at each end of pump.

### GLANDS:

Cast iron brass bushed, bolted type. Suitable packing furnished.

### WATER SEAL:

Brass. Provided at suction gland to prevent leakage of air into pump.

### SHAFT:

Open hearth steel, machined all over. Enlarged at center where impellers are mounted and secured by keys. Brass covered where exposed in pump and glands.

### OPENINGS:

Flanged on all sizes. Companion flanges furnished only on 6" and smaller pumps.

### SUBBASE:

Cast iron, ribbed and stiffened. Heavy lugs cast on outside for foundation bolts. Pads cast on top for motor feet or for pedestal bearing if pulley driven.

### COUPLING:

Flanged or flexible type.

### PULLEY:

Cast iron, one piece. Pedestal bearing cast iron, with bearing similar to main pump bearings.

### FITTINGS:

Drain and air cocks. Piping for water jacket on thrust bearing and for water seal.

### FINISH:

Painted, filled and rubbed down outside with final finishing coat. Bright parts exposed to weather protected by a slushing compound.

# Buffalo Two Stage Class "R" Centrifugal Pumps

## Ratings

Code Word, Regular Fitted, Pulley Driven	Figure Number	Size of Pump, Inches	Pipe Sizes, Inches		Capacity, Gallons per Minute		Size of Pulley, Inches		Data for Pulley Driven Pump, Only*		Approximate Floor Space, Pul- ley Pump, Inches
			Suction	Discharge	Normal	Maximum	Diameter	Face	Maximum Allowable Head in Feet	Maximum Allowable Speed in Revolu- tions per Minute	
RABAH	1224	2	2 1/2	2	100	140	6	5	250	1550	51x26
RABEJ	1224	2 1/2	3	2 1/2	155	225	7	6	250	1700	51x26
RABFY	1224	3	4	3	225	325	10	8	250	1350	67x32
RABIK	1224	4	5	4	400	550	10	11	275	1650	75x35
RABKA	1211	5	6	5	620	850	14	14	300	1300	94x43
RABNE	1211	6	8	6	900	1300	14	17	300	1330	94x43
RABOL	1211	8	10	8	1600	2000	16	22	300	1150	106x53

Add Code Word JCESF for Brass Impellers. (Furnished standard on 2" and 2 1/2" pumps.)

Add Code Word JCGMP for Monel Metal Shaft.

Add Code Word JCWAF for Motor Base and Flanged Coupling.

Add Code Word JCXRS for Motor Base and Flexible Coupling.

\* Determined by permissible belt speed.

## Speed Limits

150 Lbs. Maximum Working Pressure Built in Two Stages Only													
Size of Pump, Inches	Normal Capacity, Gallons per Minute	Speed Limits, Revolutions per Minute	Revolutions per Minute for Heads of 80 to 180 Feet per Stage										
			80'	90'	100'	110'	120'	130'	140'	150'	160'	170'	180'
2	100	Min.	1225	1300	1375	1440	1500	1550	1600	1645	1685	1725	1760
		Max.	3400	3550	3700	3850	4000	4000	4000	4000	4000	4000	4000
2½	155	Min.	1350	1430	1510	1575	1640	1700	1760	1810	1850	1890	1925
		Max.	3750	3900	4000	4000	4000	4000	4000	4000	4000	4000	4000
3	225	Min.	1150	1200	1250	1300	1350	1400	1450	1500	1540	1580	1620
		Max.	3200	3300	3400	3500	3600	3600	3600	3600	3600	3600	3600
4	400	Min.	1380	1415	1480	1545	1610	1670	1730	1785	1840	1895	1945
		Max.	2500	2650	2775	2900	3000	3000	3000	3000	3000	3000	3000
5	620	Min.	1035	1085	1140	1185	1235	1280	1325	1375	1415	1450	1490
		Max.	1950	2050	2150	2225	2300	2300	2300	2300	2300	2300	2300
6	900	Min.	1000	1050	1100	1150	1200	1245	1285	1330	1370	1410	1450
		Max.	2030	2140	2250	2325	2400	2400	2400	2400	2400	2400	2400
8	1600	Min.	720	720	740	760	780	800	820	840	860	880	900
		Max.	1500	1580	1670	1750	1840	1925	2100	2100	2100	2100	2100

**Note:** These speeds are for one stage. These pumps are always built in two stages. Divide the total pumping head into two equal parts or stages and apply speed per stage as above.

# Buffalo Two Stage Class "R" Centrifugal Pumps

## Dimensions

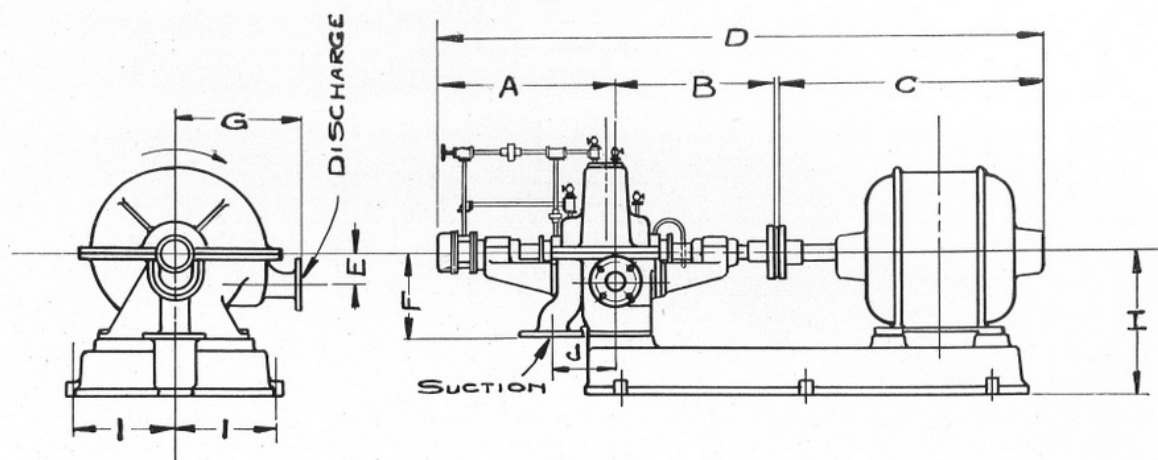


Fig. 1110

Outline Drawing—Class "R" Two Stage Pumps

## DIMENSIONS ARE IN INCHES

SIZE OF PUMP	DIA. SUCTION	FLANGE DIA.	DIA. BOLT CIRCLE	NO. OF BOLTS	SIZE OF BOLTS	DIA. DISCHARGE	FLANGE DIA.	DIA. BOLT CIRCLE	NO. OF BOLTS	SIZE OF BOLTS	A	B	C	D	E	F	G	H	I	J
2	2½	7	5½	4	5/8	2	6	4¾	4	5/8	20	17	VARIES WITH LENGTH OF MOTOR	:	3½	9½	14	15	11½	7
2½	3	7½	6	4	5/8	2½	7	5½	4	5/8	20	17		:	3½	9½	14	15	11½	7
3	4	9	7½	8	5/8	3	7½	6	4	5/8	26½	22½		:	4¾	12½	16½	21	17	10
4	5	10	8½	8	¾	4	9	7½	8	5/8	33	24½		:	4¾	12	17	21	17	13½
5	6	11	9½	8	¾	5	10	8½	8	¾	42	30		:	5¾	16	23	27¼	19½	18½
6	8	13½	11¾	8	¾	6	11	9½	8	¾	42	30		:	5¾	16	23	27¼	19½	18½
8	10	16	14¼	12	7/8	8	13½	11¾	8	¾	49¾	34¾		:	7½	22	29	32	23	22¾

Fig. 1111

Dimensions of Class "R" Two Stage Pumps

## All Dimensions Are in Inches

Companion flanges are furnished on all 6" and smaller pumps.  
 All suction and discharge flanges are drilled to A.S.M.E. standard for 125 lbs. working pressure.  
 Do not use these dimensions for construction purposes. Certified foundation prints will be furnished on all orders where requested.  
 Foundation bolts are not furnished except on special order.

## Buffalo Two Stage Class "R" Centrifugal Underwriter Fire Pumps

Buffalo Centrifugal Underwriter Fire Pumps are built in two stages for direct connection to electric motors, steam turbines or gasoline engines, and are approved by the Associated Factory Mutual Fire Insurance Companies. They are furnished in four standard sizes—500, 750, 1,000 and 1,500 gallons per minute.

Their design and construction are the same as the two stage Class "R" pumps described in this bulletin, with necessary changes as required by Underwriter specifications. Impellers are bronze; couplings are the flexible type; and companion flanges are not furnished on any sizes.

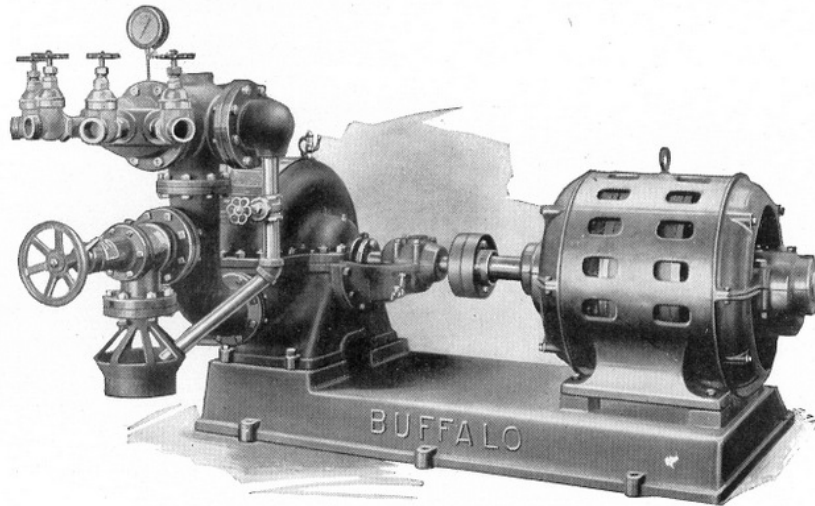


Fig. 1217  
Horizontal Centrifugal Underwriter Fire Pump

All Underwriter fittings are furnished, including starting valve and waste cone, hose valves, relief valve, discharge connection, vacuum and pressure gauges, and special nameplate.

The casings and all other working parts of these pumps are designed for a working pressure of 100 lbs. and a test pressure of 240 lbs.

If required on special order we can furnish a water-proof non-combustible screen or partition between pump and motor. This screen meets Underwriter specifications.

Conditions of installation or lack of space may make it necessary to use a vertical pump. Buffalo Vertical Centrifugal Underwriter Fire Pumps are the same construction as the standard horizontal type except for necessary changes required for vertical operation. They fully meet Underwriter specifications.

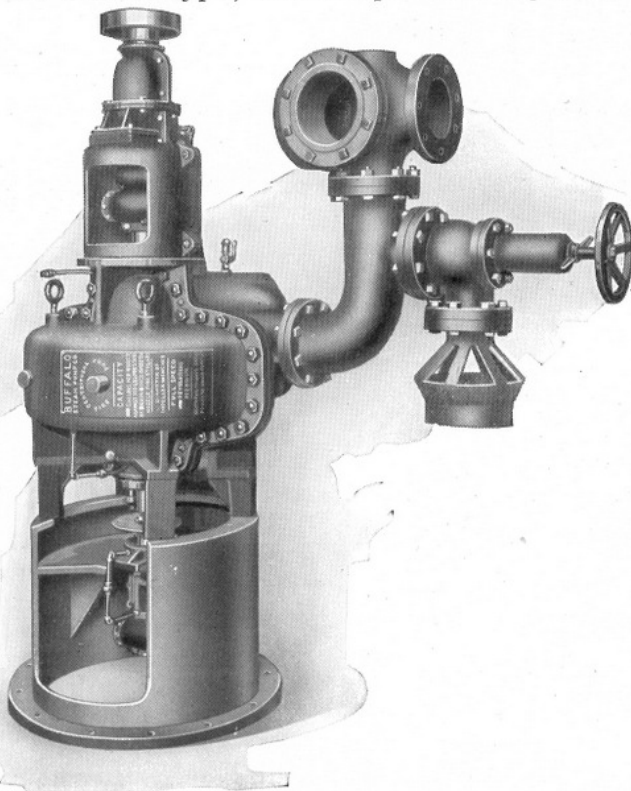


Fig. 1232  
Vertical Centrifugal Underwriter Fire Pump

# Buffalo Two Stage Class "R" Centrifugal Underwriter Fire Pumps

## Specifications

### CASING:

Cast iron, divided on horizontal center line. Suction and discharge openings cast in lower half, allowing interior parts to be inspected or removed without breaking pipe connections. Designed for 100 lbs. working pressure and 240 lbs. test pressure.

### IMPELLERS:

Single suction enclosed type. Bronze. Mounted on shaft with feather keys.

### CLEARANCE RINGS:

Bronze "L" section, floating type. Located around suction opening of each impeller and surrounding the shaft between stages. Will not turn with impellers. Prevent leakage and eliminate friction.

### SHAFT BEARINGS:

Ring Oiling. One bearing mounted on bracket at each side of pump casing. Split bushings, lined with high grade babbitt, peined, bored and scraped. Horizontally split housings.

### THRUST BEARING:

Multiple collar marine type. Horizontally split housing, babbitted. Thrust collars machine steel turned from a solid forging. Housing water jacketed. Oil circulated continuously over thrust collars.

### STUFFING BOXES:

Extra deep. Furnished at each end of pump.

### GLANDS:

Cast iron brass bushed, bolted type. Suitable packing furnished.

### WATER SEAL:

Brass. Provided at suction gland to prevent leakage of air into pump.

### SHAFT:

Open hearth steel, machined all over. Enlarged at center where impellers are mounted and secured by keys. Brass covered where exposed in pump and glands.

### SUCTION OPENING:

Flanged. Companion flanges not furnished.

### SUBBASE:

Cast iron, ribbed and stiffened. Heavy lugs cast on outside for foundation bolts. Pads cast on top for motor or turbine feet.

### COUPLING:

Flexible type.

### FITTINGS:

Drain and air cocks. Piping for water jacket on thrust bearing and for water seal. Also all special fittings required by Underwriters, including starting valve and waste cone, hose valves, relief valve, discharge connection, vacuum and pressure gauges, and special nameplate.

### FINISH:

Painted, filled and rubbed down outside with final finishing coat. Bright parts exposed to weather protected by a slushing compound.

# Buffalo Two Stage Class "R" Centrifugal Underwriter Fire Pumps

## Ratings

Code Word, Standard Pump, Without any Electrical Equipment	Figure Number	Capacity Gallons per Minute— Underwriters Rating	Pipe Sizes, Inches		Number of 2 1/2" Hose Valves Furnished	Revolutions per Minute		Horse Power Motor Re- quired for 100 Lbs. Pressure	
			Suction	Discharge		Mini- mum	Maxi- mum	40° Motor	50° Motor
QCADH	1217	500	6	6	2	1750	2000	60	75
QCAL5	1217	750	8	8	3	1150	2000	75	100
QCAMB	1217	1000	8	8	4	1150	2000	100	125
QCARG	1217	1500	10	10	6	1150	2000	150	200

Note:—In ordering, forward prepaid to our factory at North Tonawanda, N. Y., a hose coupling to be used as a template for threading hose valves on pumps, as different cities have different hose coupling standards. The template sent us should be carefully marked for identification and will be returned with the pump in box of fittings accompanying same.

## Dimension Table

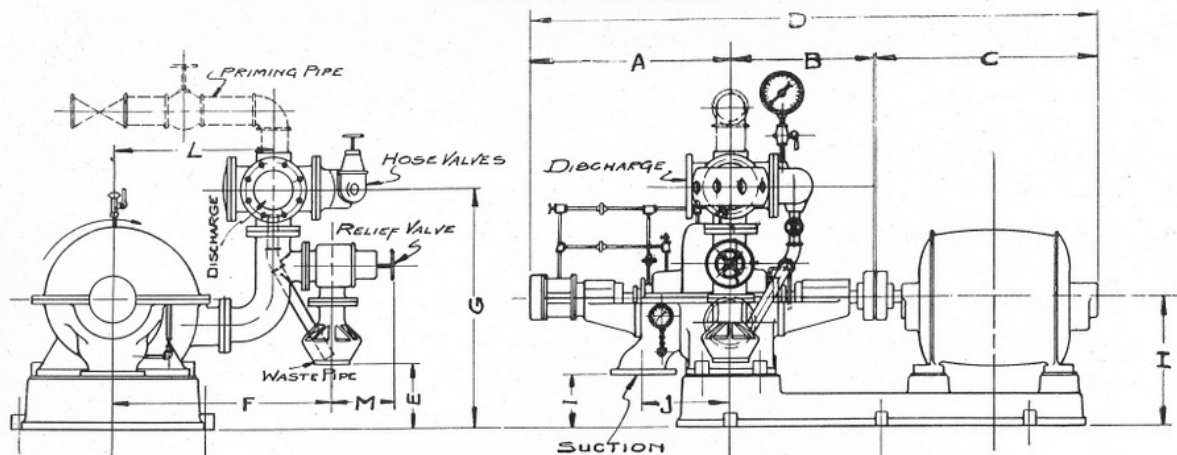


Fig. 1125

Outline Drawing—Centrifugal Underwriter Fire Pumps

*DIMENSIONS ARE IN INCHES*

GALLONS PER MINUTE	DIA. DISCHARGE	FLANGE DIA.	DIA. BOLT CIRCLE	N° OF BOLTS	SIZE OF BOLTS	DIA. SUCTION	FLANGE DIA.	DIA. BOLT CIRCLE	N° OF BOLTS	SIZE OF BOLTS	DIA. WASTE PIPE	N° OF 2 1/2" HOSE VALVES	A	B	C	D	E	F	G	H	I	J	K	L	M
500	6	11	9 1/2	8	3/4	6	11	9 1/2	8	3/4	5	2	33	24 3/8	VARIES WITH LENGTH OF MOTOR		6	36 1/4	38 1/4	21	9	13 1/2	17	26	13
750	6	11	9 1/2	8	3/4	8	13 1/2	11 3/4	8	3/4	6	3	42	30			15	44 5/8	50 1/4	27 1/4	11 1/4	18 1/2	19 1/2	33	15 1/2
1000	6	11	9 1/2	8	3/4	8	13 1/2	11 3/4	8	3/4	7	4	42	30			13 3/4	45 1/2	50 1/4	27 1/4	11 1/4	18 1/2	19 1/2	33	18 1/2
1500	8	13 1/2	11 3/4	8	3/4	10	16	14 1/4	12	7/8	8	6	49 1/2	34 3/4			17 1/2	54	61	32	10	22 3/4	23	40 1/2	22 1/2

Fig. 1126

Dimensions of Centrifugal Underwriter Fire Pumps

*All Dimensions Are In Inches*

Companion flanges are not furnished on any sizes.  
All suction and discharge flanges are drilled to A.S.M.E. standard for 125 lbs. working pressure.  
Do not use these dimensions for construction purposes. Certified foundation prints will be furnished on all orders where requested.  
Foundation bolts are not furnished except on special order.

# Buffalo Underwriter Foot Valves

## 100-125 Pounds Pressure

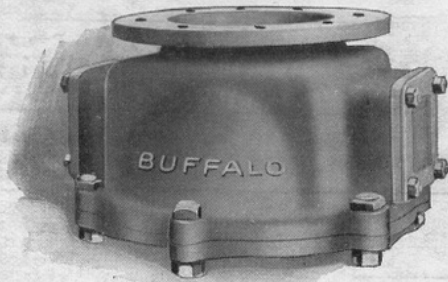


Fig. 1150

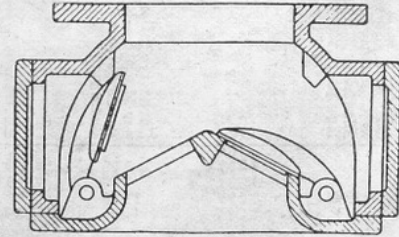


Fig. 1151

**Use:** On suction lines of Steam and Centrifugal Underwriter Fire Pumps to retain water, avoiding necessity of repeated priming.

### Specifications

**Body:** Cast iron.

**Bottom Plate:** Bronze, bolted to body.

**Valves:** Swing flaps, leather faced, hinged.

**Valve Seats:** In bottom plate.

**Strainer:** None allowed on Underwriter Foot Valves.

**Openings:** Flanged.

Size Inches	Code Word
6	QAPAV
8	QAPDI
10	QAPEW
12	QAPHO
14	QAPKD
15	QAPNC

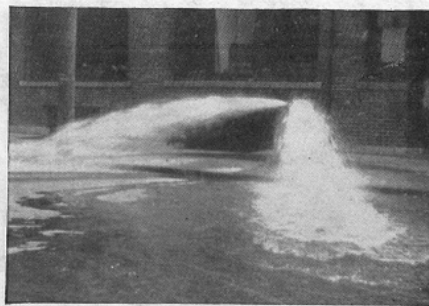


Fig. 1152  
Underwriters' Test

**SCANNED BY: AEM OF LOCKPORT NY USA**

**POSTED ON: SEPTEMBER 27, 2016**

**EDITED BY: BRIAN D. SZAFRANSKI**

**ELMA, NEW YORK USA**

**COURTESY OF: WESTERN NY GAS & STEAM ENGINE ASSOCIATION**

**ALEXANDER NEW YORK USA**

**[WWW.ALEXANDERSTEAMSHOW.COM](http://WWW.ALEXANDERSTEAMSHOW.COM)**

**NOTE: ORIGINAL DOCUMENT HAD SEVERE WATER DAMAGE**